

ABSTRACT

A microstructured optical fiber transformer element for connecting a microstructured optical fiber (MOF) to a solid optical fiber (SOF), and method of fabrication thereof, is described. The transformer element comprises an MOF-matched first end, an SOF-matched second end, and an adiabatic transition region therebetween. The adiabatic transition region comprises void patterns that gradually change over its length from an MOF-matched void pattern at the first end to a solid cross-section at the second end. The optical material of the transformer element has a refractive index profile designed to cause the adiabatic transition region to have a core size and effective refractive index profile matching those of the MOF at the first end, and matching those of the SOF at the second end, with slow, incremental changes in the core size and effective refractive index profile between the first and second end. The preferred fabrication method comprises the steps of generating a plurality of component wafers representing longitudinally consecutive portions of the preform, and then bonding the component wafers together. A component wafer is created by removing a thin slice from a conventionally-made preform and applying a chemical-mechanical polishing process to the slice until the desired thickness is reached. Lithographic techniques analogous to those used in semiconductor fabrication are used to form the void regions in the preform. Several alternative preferred embodiments for forming component wafers, including those using chemical vapor deposition, lithographic, and/or flame hydrolysis techniques, are described.